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"WE NEED TO TALK!" - PROJECT TEAMS DEALING WITH LOW CONNECTIVITY

Christina Sarigianni
University of Innsbruck, Innsbruck, Austria, christina.sarigianni@uibk.ac.at

Lena Waizenegger
University of Innsbruck, Innsbruck, Austria, lena.waizenegger@uibk.ac.at

Manfred Geiger
University of Innsbruck, Innsbruck, Austria, manfred.geiger@uibk.ac.at

Ulrich Remus
University of Innsbruck, Innsbruck, Austria, ulrich.remus@uibk.ac.at

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Research paper

Sarigianni, Christina, University of Innsbruck, Innsbruck, Austria, Christina.Sarigianni@uibk.ac.at

Waizenegger, Lena, University of Innsbruck, Innsbruck, Austria, Lena.Waizenegger@uibk.ac.at

Geiger, Manfred, University of Innsbruck, Innsbruck, Austria, Manfred.Geiger@uibk.ac.at

Remus, Ulrich, University of Innsbruck, Innsbruck, Austria, Ulrich.Remus@uibk.ac.at

Abstract

The continuous technological development and the consistent reliance on ICT, has raised the expectations towards ubiquitous connectivity to an extent that technical failures or social disconnects are a serious threat for project teams and their performance, especially when team members are scattered around the world. We analyse hypo-connectivity, the state in which users face too few connectivity to work efficiently, and focus on its impact in project teams. By applying a mixed method approach in the context of an international consulting company, we investigate the two-sided phenomenon of hypo-connectivity and aim to identify the consequences of hypo-connectivity on communication effectiveness and efficiency, as well as the role of connectivity norms in this relationship. Our results show that hypo-connectivity has a negative influence on communication effectiveness and efficiency, which consequently leads to decreased performance, increased frustration and conflicts. However, the establishment of connectivity norms in project teams can ease the effects of hypo-connectivity, sustain the communication flow and balance the negative impact. We conclude that people actually “need to talk” about the dos and don’ts that sustain their communication flow and develop connectivity norms that could help the team circumvent the negative effects of hypo-connectivity.

Keywords: Hypo-Connectivity, Communication, Team Performance, Norms, Connectivity, Consultancy.

1 Introduction

Kolb et al. (2008) state that “connectivity may be the new global imperative”, a statement that is not far from reality. The existence of numerous networks and sub-networks within organizations coupled with the adoption and continuous usage of ICT (information and communication technologies), brought connectivity to the foreground (Kolb, 2008). The rise and heavy usage of mobile devices, allow users to be connected on a consistent basis. Constant connectivity is defined as the state of being available and responsive regardless of time and place (Kolb et al., 2008; Wajcman and Rose, 2011). The phenomenon of constant connectivity has emerged during the last decade mainly due to the large network coverage and fast and ubiquitous Internet access via 3G or 4G.

Constant connectivity does not only influence people’s everyday life, but also intrudes the organizational environment and alters daily working norms and practices (Mazmanian et al., 2013; Waizenegger et al., 2016). From white to blue collar workers, connectivity becomes part of the daily routine and facilitates frequent interactions, seamless knowledge sharing and effortless communication. Especially for knowledge workers, for whom information and knowledge exchange is vital for the accomplishment of their working tasks, constant connectivity offers great flexibility and mobility (Kolb et al., 2008).

Such flexibility and mobility reflects rapidly on the communication quality. The emergence of ICT within organizations has major advantages for communication, such as the ability to process content, the flexibility to structure communication participation, the establishment of broad networks that allow access regardless of space and time, the access to information resources and the digitalization of content (Jablin and Putnam, 2000). ICT facilitates a wider communication spectrum and enhances communication effectiveness and efficiency (Papa et al., 2007).

However, connectivity is not truly constant, but people switch between three different states called requisite, hypo- and hyper-, connectivity. Requisite connectivity is the optimal state where people experience the right amount of connectivity for the situation at hand (Kolb et al., 2012). On the other hand hypo- and hyper-connectivity are considered as dysfunctional states. Hypo-connectivity is a state where people experience too less connectivity to complete the work task, (e.g., lack of Internet connection, feeling out of the "loop"), and hyper-connectivity (e.g. information overload, constant interruptions) is a state of too much connectivity. The existence of hypo-connectivity can diminish communication. Different time zones, geographical distances and employees' under-engagement could lead to problematic communication between various stakeholder such as employees, clients, executive board members, etc. On the other hand, hyper-connectivity leads to information overload and constant interruptions that result in professional burnout, exhaustion and inefficiency.

Literature to date, has focused on the negative impact of hyper-connectivity on productivity, engagement and work-life balance (Mazmanian, 2013; Wajcman and Rose, 2011), without really looking at hypo-connectivity. Reasons for that could lie to the fact that within the era of excessive ICT usage and reliable technical infrastructure, being hypo-connected does not happen very often or is not seen as intrusive as the state of hyper-connectivity. However, due to the reliance on ubiquitous functional and reliable IT infrastructure, technical breakdowns or social isolation can increase frustration and result in negative performance. Users being in a hypo-connectivity state can miss out on critical opportunities for engagement and experience a feeling of being "out of the loop" (MacCormick et al., 2012). Thus, hypo-connectivity, not just in technical terms e.g. sluggish Internet or no cell phone coverage, but also in social terms such as feeling disconnected from colleagues and friends, is an existing phenomenon (Kolb et al., 2008; MacCormick et al., 2012), which requires further investigation.

In this paper we investigate the role of hypo-connectivity on communication effectiveness and efficiency and identify how connectivity norms play an essential role on coping with hypo-connectivity. The establishment of connectivity norms already from the team composition could be a possible solution to enhance communication effectiveness and efficiency, even in cases in which project teams suffer from hypo-connectivity, since they can help teams regulate the levels of hypo- and hyper-connectivity (Collins and Kolb, 2012). Hence, we formulate the following research questions:

1. How does hypo-connectivity affect communication effectiveness and efficiency in project teams?
2. How does the development of connectivity norms influence the relationship between hypo-connectivity and communication effectiveness and efficiency?

To answer our research questions, we applied a mixed-method approach in the framework of a case study in an internationally operating consultancy. The consulting industry is characterized as a knowledge-intensive sector that requires continuous knowledge and information exchange (Kim and Trimi, 2007). Furthermore, the distributed nature of the business requires continuous use of ICT, in order to bring geographically dispersed professionals together in a timely manner (Ozer, 2000). Communication and connectivity are intertwined in consulting teams and literature about hypo-connectivity is sparse. These factors make it challenging to obtain a complete understanding of the involved phenomena. Mixed-method approaches are well suited to generate holistic insights under conditions like these (Mingers, 2001; Venkatesh et al., 2013). Therefore, in this paper we will use the insights from our interviews to interpret and explain our survey outcomes.

2 Theoretical Background and Hypotheses

Connectivity is defined as "the mechanisms, processes, systems and relationships that link individuals and collectives by facilitating material, informational and social exchange." (Kolb, 2008). Thus, connectivity represents a fundamental basis for the proliferation of interactions regardless of spatial or temporal barriers. Literature argues that connectivity influences different aspects of individual and work performance and has an impact on productivity and job satisfaction (Kolb et al., 2012). Collins and Kolb (2012) distinguish between two types of connectivity namely technical and social connectivity. Technical connectivity is defined as "the degree to which ICTs are readily available for all entities in the system and adequate for the successful exchange of resources" (Breidbach et al., 2013 p. 432), while social connectivity focuses on "the strength of social ties between entities that are necessary for the successful exchange of resources" (Breidbach et al., 2013 p. 433). Here, it is important to note that connectivity should not be set on the same level as communication. Connectivity provides the technical and social infrastructure to be able to interact with each other, while communication is the actual interaction.

A significant proportion of today's interaction is enabled through ICT. Having reliable and well-designed ICT in place allows project teams to replace traditional means of communication with modern and more comfortable channels that facilitate their daily interactions (Wajcman and Rose, 2011). Thus, email, mobile phone, text (SMS) and instant messaging, as well as online social media serve as additional means to face-to-face interactions and landline telephones (Collins and Kolb, 2012). The advance of ICT, which leads to improved technical connectivity, supports and enhances organizational communication. Organizational communication is the collective interactive process of generating and interpreting messages (Stohl, 1995) and is considered as the "central means by which individual activity is coordinated to devise, disseminate and pursue specific goals." (Gardner et al., 2000). The importance of communication for both teamwork and project management is well documented (Henderson, 2008; Hoegl and Gemuenden, 2001). Computer-mediated communication technologies have enabled work in virtual teams and the virtual organization of teams (Berry, 2011). In particular global virtual teams (GVT) have received considerable attention (Griffith et al., 2003; Maznevski and Chudoba, 2000). The continuous development of ICT, provides additional means to proliferate stakeholders' interactions and enhance their communication regardless of geographical distances and time zones.

ICT is considered as the medium with the potential to enhance communication effectiveness and efficiency (Papa et al., 2007), which are two primary goals for successful organizational communication. Effective communication refers to the accuracy of the information transmitted (Cheng et al., 2001), which means that the recipients receive the right kind of information when and where they need it in order to meet the team objectives. Efficient communication refers to the speed of transmission of messages (Cheng et al., 2001), which determines the right amount of information as fast as possible with minimal effort and cost (Collins and Kolb, 2012). The role of communication effectiveness has been investigated broadly (Burke and Chidambaram, 1996; Chidambaram and Jones, 1993; Min et al., 2010; Neufeld et al., 2010). Information richness theory defines communication effectiveness in terms of its efficacy in reducing equivocality (ambiguity) and uncertainty (Daft and Lengel, 1986). Communication effectiveness has been found to be a strong predictor of leader performance (Neufeld et al., 2010). At the same time, researchers have investigated communication efficiency especially in the context of virtual and project teams (Burkhard and Horan, 2006; Guo et al., 2009; Xiao-li et al., 2013). In contrast to face-to-face, virtual communication is found to decrease communication efficiency (Burkhard and Horan, 2006; Guo et al., 2009). Furthermore, degree of virtuality, physical distance, leadership styles and demographic diversity have been identified as influencing factors for communication effectiveness and efficiency (Burkhard and Horan, 2006; Min et al., 2010; Neufeld et al., 2010). However, the role of connectivity has not been investigated neither for communication effectiveness nor for communication efficiency. As virtual organizations and connectivity are intertwined, we see this as an important research gap.

ICT and the continuous utilization of mobile devices that support connectivity between individuals, do not always imply a state of constant connectivity. Technical failures (technical hypo-connectivity), as well as the choice of individuals to isolate and "switch-off" from their virtual world (social hypo-connectivity) can lead to hypo-connectivity. Project teams have to overcome spatial, temporal and cultural barriers (Collins and Kolb, 2012). Especially in the consulting industry, distributed teams need to work closely with each other and overcome geographical distances and different time zones. Physical or social dispersion has a negative influence on the nature of communication, since more time is required to develop or rebuild trust and relational ties (Chidambaram and Tung, 2005). For distributed teams it is often hard to find convenient times to schedule meetings and appropriate ICT to facilitate information and knowledge sharing (Berry, 2006). Hypo-connectivity could lead to under-engagement, as hypo-connected users limit their availability and responsiveness (MacCormick et al., 2012) and messages become incomprehensible (Jablin and Putnam, 2000). Isolation from team members leads to fewer interactions, decreased knowledge sharing and negative emotions like stress and anxiety (Pallud and Elie-Dit-Cosaque, 2008). Thus, even though ICT supports effective and efficient communication, reasons like, isolation, shyness or the feeling of being overwhelmed from numerous interactions, lead individuals to "switch off" from their virtual world, which can diminish the communication between the team members or create tensions with the clients. Furthermore, technical flaws, which can always occur, even with a reliable ICT infrastructure, could lead to disruptions in virtual meetings, which in turn affect communication efficiency and effectiveness. Therefore, we assume that:

H1. Hypo-connectivity has a negative influence on both communication effectiveness and efficiency within project teams.

Norms are psychological phenomena, which can describe and explain human behaviour. Sherif (1936) defines norms as "customs, traditions, standards, rules, values, fashions, and all other criteria of conduct which are standardized as a consequence of the contact of individuals" (Sherif, 1936 p.3). Raven and Rubin (1976) identify norms as behaviour patterns or beliefs that are formally or informally established as appropriate by a group. Social norms are rules and standards that are understood by members of a group and guide or constrain their social behaviour (Cialdini and Trost, 1998). Social norms emerge as a consequence of interactions among individuals. Similarly, within groups the development of norms evolves through interaction and influences the group behaviour. Norms allow the group members to anticipate each other's actions and prepare the most appropriate response in the timeliest manner (Feldman, 1984). Norms' formation, however, can be a challenging process, since a group is required to build a consensus of subjective meanings that more effectively directs the group's behaviour (Bettenhausen and Murnighan, 1985). Norms that facilitate group survival or project success are set by the leader of the group or powerful members (Feldman, 1984). The development of group norms allows members to experience a greater sense of participation (Manz and Sims, 1995) and acquire a group-based understanding of expected and accepted behaviour (Bettenhausen and Murnighan, 1985).

Connectivity norms emerge from the need of project teams to balance their connectivity levels in order to improve their communication quality. As soon as project members develop a common understanding on how, when and through which medium they can be connected, their interactions can improve regardless of technical or social barriers. Connectivity norms, very quickly solidify as members negotiate or learn which norms are supported or seem to generally work best, given the team's own experiences (Collins and Kolb, 2012). However, such norms are specific to the group and do not typically apply beyond the group's boundaries. Normative influence is able to shape interaction and can positively determine computer-mediated communication (Postmes et al., 2000). Therefore we assume that:

H2. The existence of connectivity norms within project teams weakens the extent to which hypo-connectivity is undermining communication effectiveness and efficiency.

The development of powerful ICT that enables both synchronous and asynchronous communication, facilitates an increase of connectivity and could easily lead to hyper-connectivity. Hyper-connectivity can diminish the communication between users both regarding quantity and quality (MacCormick et al., 2012). High amount of emails is not coupled with high content quality, as information overload does not allow sufficient processing of the right information. Furthermore, even though mobile devices allow efficient communication (Mazmanian et al., 2013), the effort required and the amount of distractions as second-level effects (Maier et al., 2015) can diminish efficiency. Thus, even though our focus is on hypo-connectivity, we include hyper-connectivity as a control variable to our research model. Our two hypotheses, along with the identification of hyper-connectivity as a control variable result in the following research model (Figure 1):

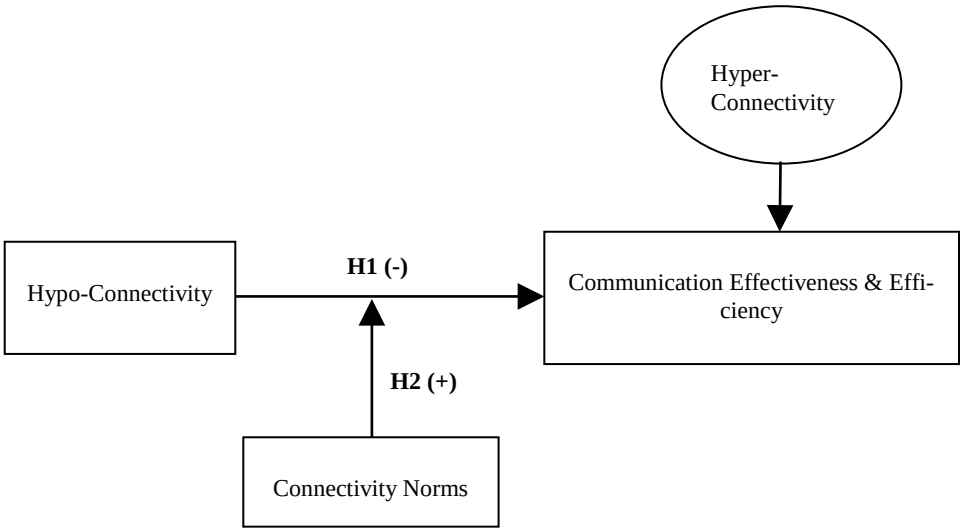

Figure 1. Research Model and Hypotheses

3 Methods

To answer our research questions, we used a mixed-method approach (Venkatesh et al., 2013) that included a survey and 38 semi-structured interviews. The mixed-method approach supports researchers to get a holistic perspective of the phenomena and practices under study and enables further enrichment of the findings with important insights. In order to obtain a complete picture of the effect of hypo-connectivity and connectivity norms on communication, we applied a concurrent research design and conducted survey and interviews in parallel. The survey allowed us to identify whether there is an effect of hypo-connectivity on communication and observe the role of connectivity norms. The interviews provided deeper insights on how and why hypo-connectivity affects communication effectiveness and efficiency between project team members and/or clients as well as, how the connectivity norms' formation takes place and stimulates communication even in cases of hypo-connectivity. According to Venkatesh et al. (2013), a mixed-method approach is suitable if a phenomenon cannot be explained using quantitative or qualitative methods alone. We deem that this applies to our case, as firstly, hypo-connectivity is under-researched and secondly, an in-depth understanding of the role of the connectivity norms cannot be achieved by applying only one method. The data for our quantitative and qualitative research were acquired from an internationally operating consultancy in Germany.

The consultancy's core businesses are project coordination, project management and process optimization in various industries. As the company is operating in three different geographical markets, it allowed us to capture a multi-faceted picture in respect to cultural differences. The company's goal is to

analyse and restructure its customers' work processes and to collaboratively develop innovative solutions to improve the clients' efficiency and productivity. The consultancy is characterized by a flat hierarchy and follows a matrix organization, where the employees are members of a project as well as a product team. The products are the centres of excellence of the company, where knowledge is developed. The knowledge and the tools created in the product teams are used in the projects later on.

At the time of our study, the company had 10 different project teams, whereas most of them differed considerably in terms of location (scattered vs. local), nature of the project (development vs. standardized project), etc. However, the main communication channels are email, TeamViewer, Lync, Skype and face-to-face conversations in all project and product teams. The project teams meet in their weekly project meetings to discuss the current status of their tasks, emerging issues with the client or the project and administrative issues.

3.1 Quantitative Study: the survey

The quantitative study took place between December 2014 and January 2015. We used the validated connectivity scales of Collins and Kolb (2012) and the tool SoSci Survey (Soscisurvey) to collect the data. The link to the survey platform was sent out by the CEO of the company in order to increase the response rate. In total 73 respondents fully completed the questionnaire, which resulted in a response rate of 48%. A summary of the demographic characteristics is shown in Table 1.

Demographic Variable	Sample Composition	
Age range	20-29	52%
	30-39	37%
	40+	11%
Gender	Men	70%
	Women	30%
Distributed Team Members	Yes	60%
	No	40%
Higher Educational Level Attained	Bachelor	30%
	Master	65%
	Doctorate	4%
	Other	1%

Table 1. Demographic Information

For the measurement of the constructs, multiple items were used as reflective indicators. The items are available from the authors upon request. To measure the connectivity levels (hypo- and hyper- connectivity), the connectivity norms as well as communication effectiveness and efficiency, we adopted the likert-type scales proposed by Collins and Kolb (2012). For the analysis of the research model we used the software SmartPLS (SmartPLS). Partial Least Squares (PLS) has been increasingly popular over the last years in Information Systems (IS) research. Reasons for that are related to the exploratory nature of PLS, since it is intended for causal predictive analysis, as well as the flexibility provided with respect to sample size and normal distribution (Urbach and Ahlemann, 2010). Furthermore, by applying PLS we had the ability to focus on individual paths and observe the explanatory power of the model, rather than the overall goodness-of-fit (Gefen et al., 2000).

The measurement model was assessed for both construct validity and reliability. In order to assure validity, measures like individual outer loadings, cross-loadings and average variance extracted (AVE) were taken into consideration (Hair Jr et al., 2013). Individual outer loadings for communication and connectivity norms returned values greater than 0.70, while for hypo-connectivity two items returned

values of 0.461 and 0.539 respectively. By dropping the first item with a value of 0.461, the model resulted in validity and reliability above the threshold and allowed us to retain the second item. Last, for hyper-connectivity one item loading returned a value of 0.676, which however did not impact internal consistency reliability and was not dropped.

	Communication	Hyper-Connectivity	Hypo-Connectivity	Connectivity Norms
Communication	**0.882**			
Hyper-Connectivity	-0.450	**0.753**		
Hypo-Connectivity	-0.501	0.300	**0.741**	
Connectivity Norms	0.587	-0.308	-0.273	**0.872**

Table 2. Fornell-Larcker criterion

Additionally, discriminant validity was observed through cross loadings, the Fornell-Larcker criterion (Table 2) and the Heterotrait-Monotrait (HTMT) ratio due to the low sensitivity of the two aforementioned measures (Henseler et al., 2015). The results showed that all constructs were strongly associated with their own measures than they were associated to the other constructs (Hulland, 1999). Furthermore, HTMT values didn't exceed the recommended threshold of 0.85 (Kline, 2015), which reveals no correlation between the constructs. For internal consistency reliability, we measured composite reliability. The returned values were higher than 0.70 for all constructs, which is considered as the threshold for construct reliability (Fornell and Larcker, 1981).

3.2 Quantitative Analysis and Results

After ensuring validity and reliability for our model, the next step was to assess the structural model. The hypothesized paths were tested for significance with the method of bootstrapping with a size of 5000. To estimate the structural model, we applied a hierarchical approach (Carte and Russell, 2003), which consists of three steps. In the first step we estimated the effects of the control variables. Second, we analysed the main effects (hypo-connectivity and connectivity norms) and last, in step 3, we focused on the interaction effect. The results are presented in Table 3.

Hyper-connectivity as a control variable is significant and the model returns an exploratory power R^2 = 20.3. Moving to step 2, the main effects are all significant and hypo-connectivity specifically has a negative influence on communication effectiveness and efficiency (β= -0.317, t-value= 2.934, p-value < 0.001). The result is in line with the argument that hypo-connectivity has a negative influence on communication and H1 is confirmed. In step 3 we assessed the interaction effects. The moderating effect is significant (β= 0.239, t-value= 2.313, p-value < 0.05), which supports also H2 and confirms that the existence of connectivity norms weakens the negative influence that hypo-connectivity has on communication effectiveness and efficiency. The main effects in step 2 explain 51.2% of the model variance and the main effects along with the interaction effect in step 3 explain 56.5% of the model variance.

	Step 1: Control Variables		**Step 2: Main Constructs**		**Step 3: Interaction terms**	
Construct	*β*	*t*	*β*	*t*	*β*	*t*
Hyper-connectivity	**-0.451*** **	4.917	**-0.222***	2.170	-0.239*	2.261
Hypo-connectivity			**-0.317*** **	2.934	-0.213	1.911
Connectivity Norms			**0.432****	5.743	0.476***	6.546
Hypo-connectivity x Connectivity Norms					**0.239***	2.313

R^2 (%)	20.3	51.2	56.5
ΔR^2 (%-point)	-	30.9	5.3
Notes: Significant results in boldface. *p < 0.05, **p < 0.01, ***p < 0.001; two-tailed test			

Table 3. Effects on Communication Effectiveness and Efficiency

Additionally, to assess the strength of the interaction effect, we calculated the effect size f^2 by using the equation: $[R^2_{included} - R^2_{excluded}] / [1- R^2_{included}]$ as proposed by Cohen (1988). A rule of thumb, according to Chin (1998), identifies effect sizes of 0.02, 0.15 and 0.35 as weak, moderate and strong respectively. Thus, with an effect size of 0.12 connectivity norms are having a weak to moderate effect on the relationship between hypo-connectivity and communication effectiveness and efficiency. In order to explain the interaction effect, we include additionally a plot (Figure 2), which illustrates the interaction effect. Thus, in cases of low hypo-connectivity, connectivity norms have no effect on communication, in contrast to cases of high hypo-connectivity, where connectivity norms can enhance communication effectiveness and efficiency.

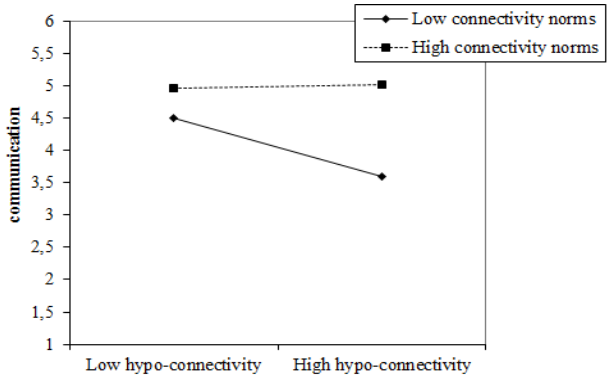

Figure 2. Interaction Plot

3.3 Qualitative Study: the interviews

The qualitative study took place between November 2014 and March 2015 and included on-site observations as well as 38 semi-structured interviews with respondents of the quantitative sample. An interview guideline was developed that included topics like the general user patterns, the advantages and disadvantages of ICT usage in the private and work-related context, and the alignment of connectivity patterns. The interviews were conducted by an experienced interviewer and member of the author team with executive board members, project team leaders, product team leaders, project team members, product team members, IT experts and office management employees. Their professional background ranged from physicists, business economists, HR specialists, and information scientists to engineers. Two pilot interviews with the employees were carried out to check the understandability of the interview guideline. In total, 23 of the interviews were conducted on site, while 15 via Skype depending on the availability of the interviewees.

The semi-structured interviews lasted between 25 and 120 minutes, were recorded and professionally transcribed. We used NVIVO software for the qualitative data analysis and applied the open and axial coding technique (Strauss and Corbin, 1998) to identify the main dimensions as well as their relationships. Based on the interpretation of our data we identified patterns such as “hypo-connectivity”, “hyper-connectivity”, “communication effectiveness”, “communication efficiency” and “connectivity norms”. These codes were in line with the main constructs of our quantitative model. By having a closer look at the codes and their relationships, we sought for an explanation on how hypo-connectivity affects communication effectiveness and efficiency negatively and how norms can improve this dysfunctional relationship. The codes as well as their relationships allowed us to explain and provide deeper insights about the results of our research model and establish a reliable link be-

tween the quantitative and qualitative results. The coding was carried out by two of the authors, independent from each other. They then compared their findings and made joint decisions for statements they had disagreed.

3.4 Qualitative Analysis and Results

Despite the fact that the majority of organizations are equipped with an extensive and reliable IT infrastructure, hypo-connectivity is still a frequent issue and an impediment for communication. This is confirmed by both our quantitative and qualitative results. In our case study, we found not just technical hypo-connectivity: *"You'll get everybody using Skype and everyone using TeamViewer, your bandwidth gets overwhelmed […]"* (Derrek_1), but also social hypo-connectivity, where professionals choose deliberately to switch off their phones as soon as they leave from work: *"I don't switch on my work phone until I am sitting in the metro.*" (Sarah). Thus, by facing technical issues or social disconnects, the professionals recognize a threat for their collaboration which has to be addressed. Indeed hypo-connectivity exists in the organizational environment and deteriorates communication effectiveness and efficiency. However, as our quantitative results reveal and our qualitative results confirm, connectivity norms play an important role in regulating this dysfunctional relationship. Some project teams establish connectivity norms right from their first meeting: *"It's very important to create that foundation so that you can steer and guide and orchestrate the group toward some objective and the thing that makes the method works"*. (Derrek_2). The development of connectivity norms allows the team members to overcome communication flaws and develop a collective plan of their communication strategy: *"In the beginning when we sit down we will go over what are those expectations for certain items? At what point do we need to go get higher approval? At what point does that higher-level just need to know the information. What is our reporting and communication path to those individuals?"* (Derrek_3).

From a technical perspective, both the distributed and the co-located project teams are highly reliant on functional IT infrastructure. Thus, as soon as technical issues arise like the bandwidth not being sufficient to transfer a great amount of data simultaneously, the communication quality deteriorates: "*[…] you lose the call, it's not dropped but you lose it and it will say waiting to get the call-back, waiting to get the call-back. So we can lose 10 minutes, 15 minutes for every call.*" (Derrek_4). These technical flaws could lead to lost connection and inefficiencies that decrease communication performance and cost additional time. The users are cut out from the information exchange and the remaining team members have to repeat what has been said as soon as the person who got dropped out returns to the call: *"I don't see how you cannot, obviously if you are sitting there and trying to be engaged and prepared for the meeting, but then the technology is failing everyone, they get frustrated, we get frustrated so yes, I think people would be misleading to say it did not impact the mood of the meeting."* (Derrek_5).

Such technical failures compel the professionals to spend additional time and effort in order to exchange ideas, develop solutions and hold a productive call with the expected outcomes. This of course not only leads to misunderstandings and conflicts between the professionals, but also hampers the communication flow: "*So it goes to a personal level which may or may not be the case. But it is a negative on, it's a negative on the productivity of the call."* (Derrek_6). Dropping out of a virtual meeting is just one example of technical hypo-connectivity. A collapsing VPN channel or a cumbersome application, which requires to enter the password several times are other examples, where hypo-connectivity impedes employees' work processes and increases frustration: *"I am annoyed, to open Cisco and give the password 18 times."* (Nick_1).

Indeed the professionals themselves can't really prevent and overcome the technical failures, however the establishment and development of connectivity norms in the course of time allows the teams to develop a group thinking that can lead to more effective communication and save extra effort and time: "*It depends on how good you know each other, how do you work together, how is your relationship. For example if I write emails with Jack, we skip the salutation after the second email. If we rec-*

ognize that we start a dialog we drop it, but this is efficiency driven." (Patrick). Additionally the agreement on specific communication media enhances the communication flow such that professionals can be as efficient as possible: "*We both like to call. Before we write long emails to each other, we just pick up the phone and call each other or use skype.*" (Trevor). Finally the development of such a collective mind-set proves to be effective even in stressful situations: "*If I sit in a meeting with a colleague of mine, I just have to look at him or not, he knows exactly which document I want. So I actually don't have to do a lot and all of a sudden a document pops up on my screen as he knew which document I was looking for.*" (Nick_2)

With respect to social hypo-connectivity, our study reveals that in many cases the professionals choose to restrict their availability or delay their responses due to various reasons: *"It (my phone) is usually switched off when I am at home.*" (Sarah). Although, that makes their lives easier and less stressful, as they can separate between their work and private sphere or avoid numerous interruptions, their behaviour can affect the communication quality with other parties like colleagues or superiors: "*In my world it is not logical at all when I write you an email and you don't respond within three days. I get really nervous. I call, write another email because I don't know what's going on. Did she get it, has she read it?*" (Nick_3). If people don't get the required information in time, they have to contact that person again and again which costs time and effort, often leads to a delay in the work process and ultimately into conflicts between the parties.

In such cases the establishment of connectivity norms can result in higher efficiency. Social hypo-connectivity barriers like limited availability and delayed responses are discussed and sometimes resolved by establishing clear rules with which all members comply. In order to counteract the lack of responsiveness and therefore the need to follow up on urgent topics, project teams often set an internal rule to respond within four hours to colleagues or superiors and within 12 hours to the client. Furthermore, the challenges increase when it comes to globally distributed teams, where geographical and temporal barriers exist. This is due to the limited opportunities of the team members to synchronize their work schedule, as well as the difficulty to develop strong social ties. Therefore, it is important to agree on pre-specified "interaction times". The team members are aware of the time difference and the availability of their counterpart. This transparency decreases uncertainty and increases efficiency. "*I knew, when it is noon for me, it is already 6 p.m. in China. That means if we had any urgent topic, it was clear that I have to contact them in the morning and we openly discussed that rule "So you know how much time difference we have, if there is anything urgent, you need our help for [...]". And of course, if they needed something, they wrote me during the afternoon and knew that they will get it not until the next day.*" (Tiffany).

However, the establishment of such norms doesn't happen overnight. It needs time and effort to develop common patterns and to clarify the mutual expectations especially towards availability and responsiveness: *"I can't establish such a group thinking, being on the same page that has to develop over time. It has to be clear that if I send something during the evening, I need a response because then it is important.*" (Tony). The development of a group thinking sustains an ideal level of communication quality, while at the same time can strengthen the social ties between the individuals: "*If an external person would look at our email exchange he or she would think that we are quite impolite in the way we treat each other. However, we know each other for eight years now so we know how it is meant."* (Patrick).

We derive from the integration of our quantitative and qualitative results that the mechanism behind the beneficial influence of connectivity norms is twofold. First, clear rules and agreements help to make sure that communication is goal-oriented and ICT usage is optimised even in situations of hypo-connectivity. Second, in a more informal way, the norms provide reassurance and mutual trust in these ad hoc situations and improve the social ties between employees, which minimise the negative effects of hypo-connectivity.

4 Discussion

The results of our study confirm that hypo-connectivity is, despite the well-advanced digital infrastructure, still an existing phenomenon that requires deep investigation. Literature to date deems hyper-connectivity as an important threat for organizations due to its negative impact on productivity, communication, stress, etc. (Barley et al., 2011; Jackson et al., 2003; Murphy, 2007). Indeed, the world we are living in is considered as a hyper-connected world, where reliable technological infrastructure and immediate responsiveness and availability are taken for granted. However, the existence of hyper-connectivity cannot undermine the existence of hypo-connectivity. Technical hypo-connectivity (e.g. sluggish internet connection, limited coverage), as well as social hypo-connectivity (e.g. lack of shared understanding, social ties) can hamper the communication quality between project team members or between project members and clients. Due to hypo-connectivity, additional time and effort is required for the establishment of a decent information flow between the involved parties. For example, if the internet connection is lost and therefore, the ubiquitous access to information and communication partners, users often become stressed as they are used to constant availability through their (mobile) devices nowadays. This is particularly true for work in distributed teams, where collaborative tools and reliable internet connection are vital elements for communication effectiveness and efficiency. Technical failures, as well as the decision of employees to disconnect, even though the other team members rely on their availability can deteriorate the communication flow and result in frustration and conflicts (Kolb et al., 2008; Pallud and Elie-Dit-Cosaque, 2008). At the same time, it became apparent that the negative effects of hypo-connectivity on communication efficiency and effectiveness are not only subject to distributed, but also to non-distributed teams. Based on the results of our qualitative data analysis, we found that also co-located teams suffer from hypo-connectivity, although they have plenty opportunities for face to face contact and do not face challenges related to time zone differences or bandwidth issues. Furthermore, the co-located teams suffer to the same extent from social hypo-connectivity, although they would have the chance to develop stronger social ties due to the various opportunities that arise owing to physical contact.

In this case study we investigated an internationally operating consulting company, which relies on stable technical infrastructure. Additionally, the professionals are expected to be almost constantly available for their clients and colleagues and respond timely to their needs. However, such expectations are not always fulfilled. Technical issues, like not being able to hold a Skype meeting diminish communication quality, hamper the information flow, negatively affect the mood of the project team and lead to the feeling of "being out of the loop" (MacCormick et al., 2012). Furthermore, when professionals isolate themselves and do not respond to their team members and clients, insecurity and uncertainty increase for the dependent parties involved.

Our study reveals that an effective strategy to mitigate the negative influence of hypo-connectivity on communication is the establishment of connectivity norms, since they enable an efficient communication flow (Postmes et al., 2000). The mixed method approach we applied, showed that in cases of technical failures or social disconnects, connectivity norms can stimulate communication effectiveness and efficiency, so that people can cope much better with the impact of hypo-connectivity (Figure 3). We identified two types of connectivity norms that are in line with Collins and Kolb (2012). First, project members develop communication style norms, which refer to the types of media they use, as well as the length and style of their responses. In such ways the frustration due to technical failures can be minimized if the project members agree on how they need to react in cases of limited coverage or broken connection. Furthermore, developing a common understanding on the style of their responses, allows members to be effective and avoid misunderstandings, since they deliver the right messages in the right tone with minimum effort and time. Second, project members establish responsiveness norms, which refer to standard response intervals that all members need to comply with. Such norms help project members to avoid conflicts and overcome geographical and temporal barriers. By complying with connectivity norms, the professionals develop mutual trust and minimize frustration that can lead to both professional and personal tensions.

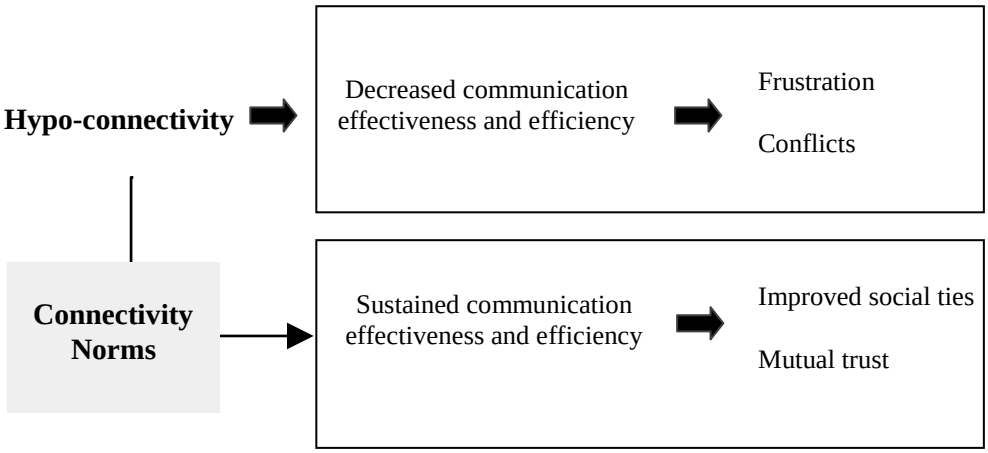

Figure 3. The impact of hypo-connectivity on communication effectiveness and efficiency and the role of the connectivity norms.

It is important to note that the establishment of connectivity norms is not panacea, but rather one approach to improve the communication deficiencies that occur due to hypo-connectivity in collaborative teams. Furthermore, both our quantitative and qualitative results, revealed no impact of the connectivity norms on hyper-connectivity. Hyper-connectivity is an ever growing phenomenon due to the expectations that increase as technology advances. Thus, hyper-connectivity requires different mitigation strategies in order to be regulated. We consider that further research is required to identify mitigation strategies that could regulate the amount of connectivity from both a hyper- and hypo-connectivity perspective.

Due to our mixed method approach, we were able to gain an all embracing perspective on the case setting. Therefore, we are able to provide managerial implications with respect to hypo-connectivity and its effects on communication efficiency and effectiveness. We consider that a differentiation between technical and social hypo-connectivity is important. On the one hand, to prevent technical hypo-connectivity, project teams need to match the ICT infrastructure with their collaboration style, tasks and own preferences. The peculiarities of each project team should be taken into consideration namely the stage and nature of the project, as well as the specific needs of the project members. On the other hand, social hypo-connectivity requires the development and amplification of social ties through team meetings and team building events. Such activities allow the team members to get to know each other, develop mutual trust, improve their communication patterns and establish rules and norms with which all members should comply. Connectivity norms within project teams are related to patterns on both how and when project members communicate. The establishment of connectivity norms like responsiveness and communication style at the beginning of the project, provides stability and certainty to the team members. As soon as project groups develop rules regarding which communication means are available or pre-specified response intervals, they can increase communication effectiveness and efficiency, avoid misunderstandings and decrease frustration. Thus, even though hypo-connectivity will still exist, by establishing and complying with connectivity norms, project members can sustain an effective level of communication, overcome technical difficulties, develop mutual trust and improve social ties that can lead to successful collaboration.

5 Conclusion

We applied a mixed method approach in the context of a consultancy to explore the phenomenon of hypo-connectivity, its impact on communication performance and the role of connectivity norms. We identified that hypo-connectivity is a phenomenon with significantly negative impact on communication effectiveness and efficiency that requires further investigation. Furthermore, we found out that the establishment of connectivity norms can be a possible mitigation strategy in order to balance the consequences of hypo-connectivity and at the same time sustain the communication flow.

This research has some limitations that have to be acknowledged. Our results are based on a single case, an international consulting company. Since connectivity, and especially hypo-connectivity is a newly researched phenomenon, we consider that further research is required in order to understand whether our findings apply also to other companies and industries, with different requirements and expectations. Furthermore, the sample of our quantitative study is rather small and thus, we consider that a study with a higher number of participants could provide more accurate results. Last but not least, the quotes used within this study were translated from German to English and were double checked for any linguistic inconsistencies. However, the original transcripts were coded by native German speakers.

We consider that further research should take over a more fine grained perspective and differentiate between technical and social hypo-connectivity. The distinction is important as technical hypo-connectivity is easier to detect (limited internet connection, inadequate ICT) and can be solved considerably fast. However, social hypo-connectivity is a subjective phenomenon and therefore hard to elicit or express. Furthermore, it is related to the social relationships among the project team members. The development and enhancement of strong social ties takes time and requires additional effort. Therefore, social hypo-connectivity is more difficult to address, though highly important for communication efficiency and effectiveness, and should therefore receive particular attention in future research.

Concluding, we claim that hypo-connectivity is a rising phenomenon but still underestimated. The advance and heavy usage of ICT during the last years, has altered the perceptions of the professionals and turned hyper-connectivity into a norm. Professionals rely on ICT to such an extent that technical failures or delayed responses can cause frustration and diminish team performance. Such inference raise the question: Is hypo-connectivity the new enemy for team performance? Indeed the establishment of connectivity norms can address some of these challenges, but is it the only mitigation strategy? We consider that further research is required to understand the phenomenon of hypo-connectivity, its impact within the organizational environment and potential measures.

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